19. The eucaryotic cell of Claim **18**, wherein said eucaryotic cell is selected from the group consisting of mammalian fungi and insect cells.

20. The eucaryotic cell of Claim **19**, wherein said insect cell is SF9.

21. The eucaryotic cell of Claim **19**, wherein said fungal cell is yeast.

22. The eucaryotic cell of Claim **19**, wherein the yeast cell is *Saccharomyces Cervesiae or Kluyomyces Sachis.*

23. The eucaryotic cell of Claim **20**, wherein the cell is selected from the group consisting of *A. oryzae*, *A. Niger*, *A. Nidulans* and *A. Awamori.*

24. A process for producing lactoferrin which comprises culturing a transformant eucaryotic cell containing a recombinant plasmid, said plasmid comprising a plasmid vector having a polydeoxyribonucleotide which codes for lactoferrin proteins in a suitable nutrient medium until lactoferrin protein is formed and, isolating the human lactoferrin.

25. A recombinant expression vector having a transcriptional unit comprising an assembly of (1) a genetic element or elements having a regulatory role in gene expression; (2) cDNA coding for human lactoferrin; and (3) appropriate transcription and translation initiation and termination sequences.

26. The vector of Claim **25**, wherein said genetic element is a promotor.

27. The vector of Claim **26**, wherein said promotor is selected from the group consisting of alcohol dehydrogenase, argB, α-amylase, glucoamylase, and benA.

28. The vector of Claim **25**, wherein said transcription termination sequence is selected from the group consisting of α-amylase, gluocoamylase, alcohol dehydrogenase and benA.

29. The protein product of the process of Claim **24**.

30. A method for producing biologically active recombinant lactoferrin comprising the steps of:

combining sequences containing a selectable marker gene, a promotor, a transcription termination sequence, and a linker sequence;

cloning said sequences to form a plasmid;

digesting said plasmid with a restriction endonuclease;

inserting a cDNA coding for human, bovine or porcine lactoferrin into a restriction site; and

transforming cells with said plasmid and the cell expressing lactoferrin cDNA.

31. The method of Claim **30**, wherein said selectable marker gene is selected from the group consisting of pyr4, pyrG, andS, argB and trpC.

32. The method of Claim **30**, wherein said cell expresses lactoferrin.

33. The method of Claim **30**, wherein said promotor is selected from the group consisting of alcohol dehydrogenase, argB, α-amylase, glucoamylase, and benA.

34. The method of Claim **30**, wherein said transcription termination sequence is selected from the group consisting of α-amylase, glucoamylase, alcohol dehydrogenase and benA.

35. The method of Claim **30**, wherein said linker sequence is selected from the group consisting of α-amylase, glucoamylase and lactoferrin.

36. A plasmid adopted for expression in a fungal cell which comprises cDNA selected from the group consisting of the cDNA of SEQ ID No. 1, SEQ ID No. 3 or

SEQ ID No. 5, and the regulatory elements necessary for the expression of the cDNA in the eucaryotic cell.

37. A process for producing lactoferrin which comprises culturing a transformant fungal cell containing a recombinant plasmid, said plasmid comprising a plasmid vector having a polydeoxyribonucleotide which codes for a lactoferrin protein in a suitable nutrient medium until lactoferrin protein is formed and, isolating the lactoferrin.

38. A recombinant expression vector for use in a fungal cell having a transcriptional unit comprising an assembly of (1) a genetic element or elements having a regulatory role in gene expression; (2) cDNA coding for lactoferrin; and (3) appropriate transcription and translation initiation and termination sequences.

39. The vector of Claim 38, wherein said genetic element is a promotor.

40. The vector of Claim 38, wherein said promotor is selected from the group consisting of alcohol dehydrogenase, argB, α-amylase, glucoamylase, and benA.

41. The vector of Claim 38, wherein said transcription termination sequence is selected from the group consisting of α-amylase, gluocoamylase, alcohol dehydrogenase and benA.

42. The plasmid pGEX-3XLFN-1.

43. A transformed cell comprising the plasmid PGENX-3XLFN-1.

44. The plasmid PT7-7hLF3'.

45. A transformed cell comprising PT7-7hLF3'.

46. A DNA sequence coding for the carboxy terminal iron binding region of lactoferrin obtained by treating the DNA of SEQ ID No. 1 with Sma I and Hind III.

47. A method of producing a biologically active fragment of lactoferrin which comprises treating the DNA of SEQ ID No. 1 with a restriction enzyme, subcloning the restriction enzyme fragment into a vector, transforming a cell with the vector, and expressing the DNA sequence to produce the biologically active fragment of lactoferrin.

48. The method of claim 47 wherein the cell is a procaryote.

49. The method of claim 47 wherein the restriction enzyme comprises Sma I or Hind III.

50. A cDNA sequence coding for lactoferrin protein, said DNA sequence comprising a substitution analog of a sequence selected from the group consisting of SEQ ID No. 1, 3 and 5.

51. A synthetic human lactoferrin comprising a product produced from a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5.

52. A method to produce synthetic human lactoferrin product comprising utilizing a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5.

53. A portion of the cDNA sequence coding for lactoferrin protein comprising regions of a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5 containing Fe binding sites.

54. A synthetic lactoferrin product comprising the portion of the synthetic lactoferrin product including at least one Fe binding site produced by expression of a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5.

55. A method to produce a synthetic lactoferrin product comprising utilizing a portion of a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5 including at least one Fe binding site.

56. A synthetic human lactoferrin product comprising a product coded by a portion of a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5.

57. A method to produce a synthetic human lactoferrin product comprising utilizing a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5.

58. A method for producing biologically active recombinant lactoferrin comprising the steps of:

combining sequences containing a selectable marker gene, a promotor, a transcription termination sequence, and a linker sequence;

cloning said sequences to form a plasmid;

digesting said plasmid with a restriction endonuclease;

inserting a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5 into a restriction site; and

transforming eucaryotic cells with said plasmid expressing lactoferrin cDNA.

59. The method of Claim **58**, wherein said selectable marker gene is selected from the group consisting of pyr4, pyrG, andS, argB and trpC.

60. The method of Claim **58**, wherein said cell expresses lactoferrin.

61. A product produced by the method of Claim **58**.

62. The method of Claim 58, wherein said promotor is selected from the group consisting of alcohol dehydrogenase, argB, α-amylase, glucoamylase, and benA.

63. The method of Claim 58, wherein said transcription termination sequence is selected from the group consisting of α-amylase, glucoamylase, alcohol dehydrogenase and benA.

64. The method of Claim 58, wherein said linker sequence is selected from the group consisting of α-amylase, glucoamylase and lactoferrin.

65. A plasmid adopted for expression in a cell which comprises a substitution analog of a cDNA sequence selected from the group consisting of SEQ ID No. 1, 3 and 5 and the regulatory elements necessary for the expression of the cDNA in the cell.

66. A transformed cell which comprises a cDNA sequence selected from the group consisting of SEQ ID No. 1.

67. A transformed cell which comprises a cDNA sequence selected from the group consisting of substitution analogs of SEQ ID No. 1, 3 and 5.

68. A method of producing a biologically active lactoferrin polypeptide which comprises constructing a 5' and a 3' primer based on the cDNA sequence of SEQ ID No. 1, using the 5' and 3' primers to amplify a portion of the cDNA sequence of SEQ ID No. 1 by the polymerase chain reaction method, cloning the amplified cDNA sequence portion and expressing the cloned cDNA to produce a biologically active lactoferrin polypeptide.

CLAIMS:

We Claim:

1. A cDNA sequence coding for human lactoferrin protein, said DNA sequence comprising the sequence of Fig. 2 SEQ ID No. 1.

2. A synthetic human lactoferrin comprising a product produced from the cDNA sequence of Fig. 2 SEQ ID No. 1.

3. A method to produce synthetic human lactoferrin product comprising utilizing the cDNA sequence of Fig. 2 SEQ ID No. 1.

4. A portion of the cDNA sequence coding for human lactoferrin protein of claim 1 comprising regions of the DNA sequence of Fig. 2 SEQ ID No. 1 containing Fe binding sites.

5. A synthetic human lactoferrin product comprising the portion of the synthetic lactoferrin product including at least one Fe binding site.

6. A method to produce synthetic human lactoferrin product comprising utilizing the cDNA sequence of Fig. 2 SEQ ID No. 1 including at least one Fe binding site.

7. A synthetic human lactoferrin product comprising a product coded by a portion of the cDNA of Fig. 2 SEQ ID No. 1.

8. A method to produce a synthetic human lactoferrin product comprising utilizing a portion of the cDNA sequence of Fig. 2 SEQ ID No. 1.

9. A method for producing biologically active recombinant lactoferrin comprising the steps of:

combining sequences containing a selectable marker gene, a promotor, a transcription termination sequence, and a linker sequence;

cloning said sequences to form a plasmid;

digesting said plasmid with a restriction endonuclease;

inserting a cDNA coding for human lactoferrin into a restriction site; and

transforming eucaryotic cells with said plasmid expressing lactoferrin cDNA.

10. The method of Claim 9, wherein said selectable marker gene is selected from the group consisting of pyr4, pyrG, andS, argB and trpC.

11. The method of Claim 9, wherein said cell expresses lactoferrin.

12. Lactoferrin produced by the method of Claim 10.

13. The method of Claim 9, wherein said promotor is selected from the group consisting of alcohol dehydrogenase, argB, α-amylase, glucoamylase, and benA.

14. The method of Claim 9, wherein said transcription termination sequence is selected from the group consisting of α-amylase, glucoamylase, alcohol dehydrogenase and benA.

15. The method of Claim 9, wherein said linker sequence is selected from the group consisting of α-amylase, glucoamylase and lactoferrin.

16. A plasmid adopted for expression in a eucaryotic cell which comprises the cDNA of Fig. 2, SEQ. ID. No. 1 and the regulatory elements necessary for the expression of the cDNA in the eucaryotic cell.

17. A plasmid designated pAhLFG.

18. A eucaryotic cell containing the plasmid of Claim 16.